

### **Abstract of the Disclosure**

A semiconductor device having a trench isolation layer in a semiconductor substrate is provided, wherein the trench isolation layer includes a silicon nitride liner, a silicon oxide liner, and a buried layer, wherein the buried layer includes a first buried layer for filling a lower part of the trench isolation layer and a second buried layer for filling an upper part of the trench isolation layer. A semiconductor device preferably further includes a silicon oxide layer disposed between the semiconductor substrate and the silicon nitride liner. The silicon oxide layer includes a thermal oxide layer densified at a temperature over about 800 °C.